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# Driving Innovation by Enhancing Employee Roles: The Balancing Act of Employee-Driven Innovation

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***Abstract*—**Our purpose is to investigate how the relationship between employees and innovation management processes can drive organizations to successful innovations. This research is deeply related to a new way of thinking about human resources management practices. It's not simply about improving the employees' engagement, but rather about a different and more radical commitment: the employee can take on the role traditionally played by the customer, namely to become the first tester of an innovative product or service, the first user/customer and eventually the first investor in the innovation. This new perception of employees could create the basis of a novelty in the innovation process where innovation is taken to a next level when the problems with customer driven innovation on the one hand, and employees driven innovation on the other can be balanced. This research identifies an effective approach to innovation where the employees will participate throughout the whole innovation process, not only in the idea creation but also in the idea definition and development by giving feedback in parallel to that provided by customers and lead-users.

***Keywords*—**Employee-Driven Innovation, engagement, human resource management, innovative companies.

## I. Introduction

IN the 1980 business leaders began to recognize that being technology driven was not good enough. Up until that point it was common for companies to create a new technology and then attempt to find a market in which the technology could flourish. Traditional Research and Development laboratories such as AT&T or Motorola R&D tried to build a mass market business for products based on a new technology that appealed only to a narrow market [1].

With a failure rate approaching 90%, R&D expenditures under scrutiny and lead-times for success averaging nearly eight years the US ICT industry clearly needed a new approach to innovation [2]. Companies began to adopt the ideas and principles associated with the customer driven approach, i.e., first understand what the targeted customers' needs and wants are, and then invest in the creation of a new product or service to meet those needs. Indeed, over the past two decades, the customer driven approach has become the mantra for all organizations and for innovation activities in particular. But after twenty years of customer driven thinking, US companies still find that 50 to 90% of their new product and service initiatives fail [2].

A major difficulty in the customer driven approach is that customers express their requirements in a language that is convenient for them, which often, however, is inappropriate for creating innovation. Following the same trajectories, the employee-driven approach, where employees systematically and actively contribute to the generation of new ideas which create value when they are implemented [3]-[5] also present problems, especially by introducing variability into the innovation process.

In this paper, we propose new practices of innovation management through which employee-engaged organizations can define the right innovation for the right opportunity by testing ideas and innovative concepts not only with customers, but with employees who give feedback on the innovation from idea to prototyping. With this methodology the uncertainties and risks linked with innovation are decreased for several reasons. First, a common language is created between innovators and users in order to give correct feedback and engage in productive dialogue. Second, resources can be more effectively directed towards the right opportunities. Third, when the opportunities to pursue are defined, all relevant resources of the organization can be focused on developing the right idea in the right way.

The paper relies on analysis of secondary case data from innovation leaders in the ICT sector to address our research questions.

After a literature overview focusing on Employee- Driven innovation (EDI), we analyse selected cases in search of good employee engagement practices for enhancing innovation.

In the final section, we summarize and discuss the findings, proposing a framework for how to address employee-driven innovation challenges. Limitations of the research and future research directions are also discussed.

## II. Literature Review

Similar to phenomena such as intensified competition and globalization, technological innovation is an important driver for changes in the broad area of human resource management as employees are started being considered more strategically also in relation to innovation outcomes [6]. As [7, p.20] put it: "any preconceptions a company holds about the who, what, when, or how will necessarily blind it to potential sources of

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creativity". Nevertheless, most employees are usually not involved in the innovation and product/service development process as idea generation, testing and development are still mostly executed by a limited number of R&D professionals, although it could be beneficial for the innovation outcomes to engage all the human resources in the processes.

Over time, many new practices have been introduced in organizations in order to capitalize more and better on employees' ideas, competences and knowledge, both explicit and latent. A basic role is to see employees as a resource for idea generation. The focus has been on the employee's creativity and the best ways to capture it [8]. From the suggestion box to the Idea Management Systems [9] employees were encouraged to formulate and share innovative ideas essentially about how to change or improve methods, procedures and systems, i.e., contributing to incremental process innovations. The suggestion systems of KPN, Xerox Venray, and Shell are part of a non-exhaustive list of excellent examples of this approach. At Xerox Venray, a fully automated system helps the employees "to both give their suggestion and to monitor its progress with regard to the evaluation and possible implementation online"; furthermore, the company "communicates messages such as 'register even the smallest idea' through brochures, posters and staff magazines" [10]. Still, suggestion systems are usually conceived as part of a continuous improvement strategy in which the employees only submit ideas, which then will be assessed and implemented (or not) by 'experts' [11].

With the same 'idea creation' purpose in mind, some organizations allow employees to use a percentage of their time to develop something new, or might allocate a space within the ordinary work structure for creative company-related activity [12]. One example is Google's "Innovation Time Off" where engineers are allowed to spend up to 20% of their time to work on something company-related that interests them personally [13], [14].

A more recent development relates to the surge of Open Innovation [15], [16] where emphasis is placed on employees' ability to acquire ideas from beyond the company's boundaries in an open innovation process, i.e., "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model" [16, p.12]. Specifically, [17] suggests how a company could achieve competitiveness creating and managing employee networks by defining two different employee roles: the 'idea scout' and the 'idea connector' role. Previously, [18] suggested the critical role played by employees as central connectors. In an employee network, the idea scouts are the people looking outside for new and potentially applicable ideas. They are normally well connected to external knowledge sources, but they lack internal networks. On the other hand, the idea connectors – the hub of the company's social network – are very well connected internally, and if they learn from the scouts about an opportunity for innovation, they 'not only know who in the company is best equipped to exploit that' but also they can 'rapidly deploy the network to meet that particular challenge' [17, p.39]. The idea scouts and connectors can emerge informally, or a company can strategically assign specific employees to those roles. For example, Procter & Gamble has formally appointed idea scouts to seek out new technologies anywhere around the world [17]. Once again, however, far from all the 'ordinary' employees are involved in these processes as only a few specific professionals can really play those roles. Going one step further, Employee-Driven Innovation (EDI) is a form of direct participation in which the employees take the initiative to develop, propose and implement change [5]. Reference [3, p.2] suggest the following definition: 'EDI refers to the generation and implementation of new ideas products and processes originated by a single employee or by joint efforts of two or more employees'. Authors [5] underline the need to focus on all the employees in relation to innovation, and how to engage them in various collaborative forms of innovation depending on each and everyone's specific job roles, capabilities and competences.

One way of advancing in this direction is to conceive employees as users of product/service innovations but also other forms, e.g., process innovations within the company where they "may exhibit behaviors typical for user-innovators, albeit inside their own firms, by modifying or creating processes, products, or services" [19, p.3]. Specifically, [19] found that "the employees-user proposals are more likely to be turned into the firm's broader practice than other proposals are" and that contributions by employee-users go "beyond process and product improvements and also include new revenue generators" [19, pp.17-18]. Eventually, these insights suggest that the employees that act as innovation users within their own firm may help to improve the overall company performance. Table I provides an overview of the different employee roles advanced in the analyzed literature.

TABLE I
EMPLOYEE ROLES

| Role of employees | Main point | Author(s) | Practical example |
|---|---|---|---|
| Idea creator | Transforming employee creativity into practicable ideas | Van Dijk & Van den Ende [10]<br>Meridatta [13]<br>John Nightingale and Girija Swaraj [14] | Xerox Venray, KPN, and Shell suggestion systems<br>Google "Innovation Time Off" |
| Idea scout – idea connector | Importing outside ideas (idea scout) and leveraging the internal network to adopt those ideas (idea connector) | Parise, Cross, Davenport [18]<br>Whelan et al. [17] | Procter & Gamble's idea scouts |
| User innovator | Employee may behave as user-innovators within the firm by modifying or creating processes, products or services | Zejimilovic, Oliveira, Veloso [19] | A new product, a new service, a new internal tool, and a process improvement in a large ICT firm[a] |

[a] Case study in [19]

The challenge for EDI today is to move away from an essentially unstructured and spontaneous approach, where employees decide to behave as users on their own, to more specific programs designed and managed in order to enhance

EDI's positive impacts on innovation. As [4] summarize their conceptualization of EDI, it makes theoretically perfect sense to break down hierarchical barriers in order to involve ordinary employees and make them contribute creativeness, networks and specific knowledge to the innovation process. However, they also emphasize that this will not work unless there is an effective balance between the need for specializes skills of those employees traditionally involved in innovation and the broader employee contribution. The key to achieving this is to consciously manage the innovation process integrating both. As this brief review shows, EDI is still a nascent phenomenon, and mostly focuses on how all employees can be involved in the early phases of innovation and not in the overall process, where focus still is on the R&D employees. Moreover, when it comes to testing prototypes or early service concepts, the dominating idea is still that this should be confined to customers only. Based on the above, some of the challenging questions for developing and refining EDI include:

1. How to encourage employees to become product/service users within the firm?
2. What should be the mix of spontaneous, self-initiated activities on the one hand, and guided structures for employee driven innovation on the other?
3. In what part of the innovation process is it desirable to involve the ordinary employees?
4. What are the major gains companies can reap from EDI that create an innovation advantage?

By examining leading companies' approaches to EDI, we attempt to provide some enlightening answers to these questions.

## III. Methodological Approach and Case Selection

According to case study methodology, our cases are chosen for theoretical rather than statistical reasons [20], [21] with the specific purpose to extend emerging theory [22]. A multiple case strategy is defined to obtain 'more robust theory because the propositions are more deeply grounded in varied empirical evidence' [23, p.27]. However, choosing right and accurate cases in very small samples is a challenging endeavor [24]. In order to justify the choice, the cases have to represent some quite unique and outstanding phenomena or practices in relation to the subject undergoing study [25].

From an initial list of organizations in the ICT industry, we selected 10 particularly interesting for our research in terms of innovation intensity, employees' role in innovation and the turnover growth rate in the previous four years. We collected information using secondary sources about these companies and we selected the final sample with the use of unstructured interviews and meetings with innovation and business model experts in four different universities (University of Torino, Westminster University of London, Athens University of Economics & Business and Politecnico of Milano). Interviews were based on concepts of innovativeness, innovation creation, and innovative culture and employees. The output of the interviews was the definition of three cases considered particularly important for our research: Microsoft, Google and Apple. These companies are universally recognized for their ability to create innovative product appreciated by the market and their unique innovation-oriented structures and organizations. In particular, all three companies have pioneered practices related to EDI [14]-[27].

Innovation does not simply happen: It requires a purposely-oriented engagement of all the people across the company through specific programs and strategies. Compared to other industries, some ICT companies seem to early introduce a novelty in the employee engagement practices. As proposed in previous research [19] this could be partly due to the specific nature of ICT companies and their employees since in ICT, "skilled employees have an abundance of tools within the firm that they can use to exploit and experiment with their ideas" [19, p.27]. Moreover, the trend of employees evolving from 'ordinary' employees, i.e., replaceable low-skilled labor to uniquely qualified life-long-learning human resources [4] has been particularly strong in the ICT industry where most employees are required to possess high levels of knowledge and skills. Data have been collected from secondary sources: employees' blogs, companies' websites, on-line articles, academic books and papers. The next session is devoted to practice cases analysis.

## IV. The Cases: Microsoft, Google, Apple

### *A. Employees' Engagement Practices at Microsoft*

After Apple, Microsoft is the world's second most valuable brand. With over 100,000 employees, it is considered one of the best workplaces in the world ("2014 World's Best Multinational Workplaces" and "2014 Fortune's 100 Best Companies to Work for®", by Great Place to Work). At Microsoft the flat-hierarchy helps people to connect with each other at every level. The employee responsibilities are often very high, at the same time people are motivated to become involved and are really recognized for the work done for the company's success, as these quotes show:

> "Every person is approachable, and you can speak easily with managers at all levels if the need arises. This creates a friendly and comfortable atmosphere, making the office a place where people actually WANT to work" [28].
>
> "The best thing about working for Microsoft has to be the exposure to senior management in the business and being given the autonomy to not only be exposed to the senior leadership team but make a real difference to the organization and receive the appropriate recognition for doing so" [29].

Among the different employee engagement practices at Microsoft, the "ThinkWeek" represents a long-standing tradition [30]. It offers employees the opportunity to engage in meaningful, cross-company dialogue with executives and the ThinkWeek community around topics that impact the future of the company. This strategy helps the company to establish a whole internal process for evaluating and implementing the employees' great ideas [31].

Microsoft has since long engaged its employees with this and other tactics in the innovation process. More precisely, we detail two specific practices: dogfooding and synch-and-stabilize.

Dogfooding

This expression comes from the idea that companies should eat their own dog food, which means using internally their own products. Microsoft adopts the phrase "eating our own dog food" - or "dogfooding" - to describe the practice of rolling out new software to its employees first, letting them experience and report problems to ultimately improve the public release. The idea is that if you expect the public to buy and use these products, you should be amenable to using them yourself. This practice also lets employees test the products in real-world scenarios and report flaws [32]. Microsoft was an early adopter of this practice, probably the first in the ICT industry. One practical example of this strategy was the development of the SharePoint 2010. Microsoft built various internal Web sites on SharePoint, such as a YouTube-like site for posting podcasts and videos – the so-called "Academy Mobile" inside the company [33]. More recently, the team of Jim DuBois - current CIO - and Microsoft's 100,000 employees together provide the proving ground for products like Microsoft Office and Azure before they are released, which means the company is running on software that sometimes isn't quite ready for prime time. Nevertheless, DuBois' team makes it works while providing direct feedback to the Microsoft product groups so they can improve and enhance the products before their commercial release [34].

> "I love being surrounded by smart, diverse, and motivated people. (…) Microsoft IT needs to trust employees to do the right thing, and tolerate more risk than IT staffs in most other industries. (…) I have higher expectations of Microsoft employees to educate themselves on how to use devices wisely and how to treat different types of data. And that means that I expect Microsoft employees to work with pre-release versions of the Microsoft products and services so they can help us provide feedback on their experiences. The IT staff manages this process, which is called "dogfooding" internally, because we eat our own dog food before it's available to customers" (DuBois' CIO at Microsoft from January, 1st 2014) [34].

Microsoft usually implements the dogfooding process through distinct phases of early product adoption: investigation, rollout and reporting, evangelism [35].

> "One of the most difficult things to duplicate in any test environment is performing stress tests that accurately simulate the live traffic volume that production servers handle on a day-to-day basis. We achieve this by building redundancy and scalability into the architecture of our production environments, and by implementing an early adoption process that uses our servers as early test beds for pre-release versions of products" [35].

Behind the dogfooding strategy there is a company's awareness: if they can successfully run pre-release builds of Microsoft products in their company's environments, they can significantly increase the probability that the final products will perform well in the customers' enterprise environments as well. The company also implements this practice with specific strategic intents. The most important concern: (a) to obtain a higher product quality, since the employees identify as many bugs as possible in the pre-release version of a product so that the Product team can resolve them prior to the market launch. This process helps ensure a more stable and reliable version of the product for customers; (b) to offer useful adoption information – such as white papers, articles, blogs, and "How We Do It" webcasts - that the company can showcase on the Technet Microsoft.com website.

In the whole "dogfooding" process, the Microsoft's employees are completely involved.

> "I get to attend events, training abroad, see new devices before they are released, work with people at the top of their game within the industry. Be given immense responsibility" [36]

Synch-and-Stabilize

Although in developing new products quickly, small teams seem to be more effective than larger ones [37], this doesn't work for Microsoft. In fact, by engaging a greater number of employees in the product development process, the company becomes able to manage large teams and make them working like small teams. Effectively, in the Microsoft's synch-and-stabilize approach, teams and individuals are allowed to be creative and retain the autonomy of small groups. Teams frequently synchronize what people are doing working in parallel on different features, and periodically stabilize the design changes or feature innovations that they are continuously making [38]. Specifically, since the 1990s, Microsoft has begun to allocate a growing number of employees to testing and programming. The first version of Windows NT represents one significant example. It consisted of around 4.5 million lines of code and had a development team - program managers, who work on product specifications as well as project management, developers, and testers - of about 450 people. Something similar happened with Windows 95 then. Again, a team of about 300 people was allocated for the development of the Microsoft's Internet Explorer browser, and several hundred more people were involved in creating various add-in features, like the Internet mail. Helped by such a number of employees, the company is able to discover and solve problems before they can generate millions of customer complaints. Thus, Microsoft's quality has improved dramatically over time. The company reduced bugs but also products that are far more complex yet much easier to install and use compared to the old MS-DOS or early Windows systems and applications. These results seem to directly reflect the investment in testing as well in process and product improvement [39].

> "Everyone at Microsoft "gets" software — the managers, the administrative assistants, the vice presidents... Even many of the "blue collar" workers (cooks, janitors, bus drivers) know something about

> software — it's not normal! At NASA, most managers and even some scientists had no real understanding of software or software development. Elevating the common denominator in this way makes Microsoft a wonderful workplace for people who love making software" [40]

"Great opportunities to be involved with other parts of the business, which in a typical company would not be possible. - Great people, always happy to help. - Heavy investment in training and readiness" [41]

*B. Employees' Engagement Practices at Google*

Google is considered one of the most innovative companies and the 'Best Company Work for' 2014 ("The World's Most Innovative Companies" by Forbes and "2014 Best Companies 2014" by Fortune). It employs over 42,000 individuals, named Googlers, and most of them are software engineers. The Google campus in Mountain View, California, is considered the 'one happy town' for employees [42]. In a very unconventional way, the company offers not only all the comforts, privileges and perks to its employees, but it aims also to give them the perfect environment – called the 'living laboratory' – a working place where engineers and creative people can really have the opportunity to meet and sharing idea as well as testing them following the "MIT living lab" concept [43]. Google is a highly collaborative workplace where the open floor plan suits the engineering process. If with the well-known and early replicated "Innovation Time Off" program, Google allows all its employees to take up to 20% of their time to work on a new concept or to pursue special projects. That means for every standard work week, employees can take a full day to work on a project unrelated to their normal workload but what is the impact? The company affirms that many of their products in Google Labs started out as pet projects in the 20 percent time program [44]. Generally:

> "Google works from the bottom up. If you have a great technical idea, (…) you take it to your fellow engineers and convince them that it's good. Good ideas spread fast, and this approach keeps us from making technical mistakes. But it also means that the burden falls upon you to spread your idea" [45]
>
> "Google is a company that is constantly pushing to improve itself. Just like software development itself, most environment improvements happen via a bottom-up approach. All engineers are responsible for fine-tuning, experimenting with, and improving our process, with a goal of eliminating barriers to creating products that amaze" [46]. More specifically, we detail three employees' engagement practices at Google: dogfooding, grouplets, and testing on the toilette.

Dogfooding

Google makes heavy use of its own products, and this is one of its most important testing processes. This practice is not simply a testimonial advertisement that shows the company confidence with its products, but a strategic tool going beyond marketing: with this tactic, all the employees can provide feedback on the products before release.

> "We also get many comments about overall product quality and usability. This internal feedback has, on many occasions, changed product design. (…) I don't think there is a single public-facing product that I have not reported bugs on" [46]

While the test-focused engineers are in all the phases of the development process working very close to the product developers, in the dogfooding phase all the employees are working as testers from the early beginning of the idea giving feedback to improve/change the product under development.

> "From system design documents, to test plans, to discussions about beer brewing techniques, our products are used internally" [46]

Here just some practical examples: Google Drive Apps, such as Docs, Sheets, Slides, etc., are used internally for design documents, test plans, presentations etc., Gmail and Hangouts for email and chat, Google Maps to map office floors, while Google App Engine can host many corporate, development, and test apps. The Android is a famous "dogfooded" company's product.

Grouplets

These are autonomous groups formed into the company without specific budget or decision-making authority; grouplets normally start only with a specific idea or project based on "employees job to be done", and aim to convince the rest of the company to adopt it. For example, "Testing on the toilet" detailed below is a testing grouplet idea - a group of employees autonomously formed around ideas related to test phases.

> "Grouplets bring together like-minded engineers who care about things like documentation, improving our build system, or testing. It's an informal process lets engineers contribute on the topics that they care about the most" [45]

Testing on the Toilet

This practice born in the Testing grouplet - a team of engineers pooling their 20% time to drive automated testing adoption throughout Google. The Testing Grouplet was working closely with the Testing Technology and Build Tools teams to spread knowledge and adoption of their products while providing practical feedback and thoughtful suggestions. In the Testing grouplet the main idea was to have developers start writing their own tests.

> "By far the most visible tool we created was Testing on the Toilet, a weekly (usually) flyer published in all the bathrooms throughout all Google engineering offices. Originally tossed out as a joke during a quarterly goals brainstorming session as an idea to spread testing awareness and knowledge, TotT quickly scaled-up to become a company-wide publication with an efficient, international, all-volunteer production and distribution pipeline. Early on, each episode focused on a particular unit testing technique or tool, providing enough

information to illustrate a basic idea, with links to more information on the internal wiki. As time went on, episodes also began to focus on larger design issues, new internal tool developments, and announcements of events like Fixits, in which we could marshal every engineer to take care of important-but-not-urgent tasks–such as writing and fixing tests, or adopting spiffy new tools that made development more productive all-around" [47]

Thanks to this practice, the testing team received a lot of feedback from all the rest of the company. This helped them to avoid many problems, to hone their ideas and also to create new ones. Eventually, the "Testing on the toilet" idea became part of the company culture, and a very useful tool to improve testing processes and techniques.

*C. Employees' Engagement Practices at Apple*

With more than 80,000 employees, Apple is considered one of the most innovative companies and the world's most valuable brand ("2013 Innovative Companies" and "2013 World's Most Valuable Brands" by Forbes). At Apple it's all about communication, open mindedness, and collaboration. Everyone is encouraged to express his/her ideas [27]. Apple always challenges its employees to drive innovation, and the iPod creation may represent one famous example of this ability [48].

"Getting to work with smart people is great. Most people are self-starters who are driven to accomplishment and Apple culture reinforces that drive" [49]

"When you're working at Apple, you believe that you are working on some of the greatest products possible. And those around you feel the same way. Apple's constant claims about attention to detail and pursuit of perfection aren't just PR - there's a drive within each employee to not cut corners and to obsess over pixel amounts" [50]

There is certainly much more to the company success than product performance or industrial design. Our focus is on the company strategies to challenge its employees to achieve a bigger competitive advantage. For this purpose, we specifically identified three Apple's employees' engagement tactics: dogfooding, employing retail workers to test new apps, and offering huge discounts.

Dogfooding

Since the beginning, the company is using its own products and services to test internally their capabilities. As earlier noted, Apple has inaugurated the workplace of the future by putting its personal computers on most of its employees' desks [51]. The Dogfooding strategy is crafted with many different tactics. For example, early on Apple started offering employees voluntary classes in popular software packages. As an incentive to developing computer literacy, any employee demonstrating proficiency with two programs is loaned an Apple II Plus, a disk drive, and a monitor for use at home. Then the practice continued with Apple III, and so on.

"They really focus on the people, with a great corporate culture (…). There is a big emphasis on training and getting to know the product, so that customers are well informed of the benefits, but also an emphasis on getting to know the customer so that they're matched with the right product, regardless of price-point" [52]

Apple has always employed its own computers for technical purposes, from quality control on the production line – since every completed micro system is given a final check by an Apple computer - to software evaluation. Thus, more recently, and after making the improved iWork for iCloud Beta available to its registered developers via the beta.icloud.com web page, the company has just started dogfooding the software to all its employees [53].

"iWork has always been the best way to be productive on the Mac. And iWork for iOS makes it easy to create beautiful documents on iPad and iPhone. Now with iWork for iCloud we're bringing Pages, Numbers, and Keynote to the web — so you can access your documents anywhere from a Mac or PC browser. iWork for iCloud beta is currently limited to Apple Developer Program members, but we'd also like to make this service available to Apple employees for personal use. To enable the beta in your iCloud account, just click Get Started and follow the steps outlined" (internal e-mail) [54]

This program is open to all the employees; other company's programs are specifically addressed to retail workers.

Employing Retail Workers to Test New Apps

From the beginning of July 2014, Apple is seeking employees from its own retail stores who have shown an enthusiasm for photography to test the upcoming OS X Photos application and iCloud Photos feature [55]. This is not the first time for Apple. In the last two years the company has offered many testing programs to retail staff. Apple typically offers career experience programs for retail employees that have worked at Apple for at least one year. These opportunities allow employees to try out various positions within Apple Corporate, typically ranging from marketing and engineering on existing products. The company utilizes retail employees for these efforts as a method of further intertwining the culture of both major parts of Apple's employees base and in order to provide a wider, yet still mostly controlled, testing environment. In 2012, Apple expands testing of OS X Mountain Lion asking select members of its retail store staff to begin testing the software and providing access to its OS X Mountain Lion AppleSeed testing program. In an e-mail to store workers revealed, Apple has invited its Genius Bar members and Creatives to partake in the AppleSeed testing program. Available to select customers as well as employees, this program gives participants access to pre-release software so they can test the products and provide feedback to the company. Those who join the program adhere to a confidentiality agreement that prevents them from sharing the software with anyone else. Apple provides various tools for users to offer their feedback, including Web forms, discussion lists, mailing lists, engineering questionnaires, and bug reports. This testing is to be done on personal Macs belonging

to employees, and is not standardized in-store OS X Mountain Lion training [56]. After the OS X Mountain Lion testing program experience, the company starts something similar with its OS X Mavericks. Further, Apple has provided pre-release versions of Mavericks to its AppleSeed beta testing group.

> "You are invited to participate in the pre-release OS X Mavericks seed program. Participation, including submitting feedback, is completely voluntary and not an expectation of your job. If you accept, we will provide you with a pre-release version of OS X Mavericks to install and use. You will get to preview all of the exciting new features like iBooks, Maps, Calendar, Safari, iCloud Keychain, Multiple Displays, Notifications, Finder Tabs, Tags, and much more! You should use OS X Mavericks only your personal computer and on your personal time. Apple will provide you with ways to submit feedback on your experiences with OS X Mavericks, should you choose to do so. Apple also asks that you use future builds of OS X Mavericks as they are made available. The responses from prior seed programs have been overwhelmingly positive. Thank you to everyone who participated!" (internal e-mail) [57]

Notable is that not only these programs will provide additional testers for Apple, but will also enable retail employees to become familiar with the forthcoming operating systems before formal trainings begin.

Offering Huge Discounts

As an integral part of the broader "dogfooding" strategy, this last tactic helps the company to build a culture of fandom making each employee a brand ambassador. Apple allows employees to use many of its latest products on a daily basis, at the same time encourages them to buy its products with huge discounts. These usually fall in the 15 to 25 percent range, making easy for staff to buy the latest company "jewel".

> "Great benefits such as health care for part time employees, free software, and product discounts" [58]
>
> "Awesome co-workers and managers, paid training, amazing employee benefits (discounts on Apple Products)" [59]

Already famous for its consistent discount programs offered to the employees in late January, 2012 the company announced a new major Mac and iPad discount program for employees to be implemented [60]. Employees can now purchase Macs with a $500 discount, and iPads with a $250 discount through Apple's internal employee portal. These discounts come on top of the already-existing 25% discounts [61]. Furthermore, Apple frequently gives every employee gifts ranging from the iPod shuffle to the iPhone. Also, before Apple recycles a computer, it gives employees the opportunity to take it home.

## V. Discussion and Conclusion

Innovation management traditionally places emphasis on the external customers when it comes to specifying the innovation goals and outcomes, and testing and assessing innovations in becoming. The objective of this paper was to identify good practices of Employee Driven Innovation (EDI) from leading organizations in order to advance the understanding of this emerging concept and practice, and attempt to provide some guidelines for how it can be implemented in organizations. Although all the case companies pertain to the wider ICT sector, the identified practices are general enough for adaptation and adoption in other innovative companies.

Table II summarizes the identified EDI tactics and the impact they have on the innovation process.

TABLE II
Employee Engagement Tactics and Their Impact

| Company | EDI tactic | Impact |
|---|---|---|
| Microsoft | *Dogfooding* | Identifying and solving problems during the development process, before publicly releasing the product/service |
| Google | | Showing the company's confidence with its products |
| Apple | | Testing the products in real-world scenarios and reporting flaws |
| Microsoft | *Synch-and-stabilize* | Keeping large teams but enabling them to work like small teams through frequent synchronizing on specific tasks |
| Google | *Grouplets* | Autonomously formed groups around a self-initiated issue with a mission to do a specific job and convince the rest of the company to adopt innovative ideas/projects |
| Google | *Testing on The Toilet* | Improving testing processes and techniques through idea postings in the bathrooms, company-wide and on a weekly basis |
| Apple | *Employing retail workers to test new apps* | Providing a wider and even more controlled testing environment |
| Apple | *Offering huge discounts* | Making all the employees brand ambassador<br>Building a culture of fandom |

**Dogfooding** was identified as an important tactic in all three companies. This approach, which is grounded in the logic of an organization using first and foremost its own products and services, can be implemented in various ways with different but complementary impact. When used in the early stages of development, as in Microsoft, it contributes to the early discovery and easier correction of bugs and defaults. When used for testing in real-world contexts, stability and functionality can be improved. It also, as particularly practiced in Apple, contributes to show confidence in products and reinforce brand image.

Among the other tactics, **synch-and-stabilize, grouplets,** and **employing retail workers** all activate the employee crowd for contributing ideas or conducting tests in wider and more diverse user situations. Thus these activities enhance the opportunities both of identifying innovative improvements and difficult-to-discover weaknesses, problems or glitches, especially in software and service solutions.

A common denominator for these EDI practices is the active involvement of a large number of employees, which both explicitly and implicitly enhances motivation through involvement and ownership of the companies' products.

From the literature review, we generated four questions about major EDI challenges, then illustrated how the cases addressed these challenges. When it comes to different ways

of encouraging employees to become product users, the starting point is to create a culture where employee ideas are valued and employees feel that their inputs really make a difference. All three companies have managed to create a culture where the contribution of ideas has become a natural part of the every-day tasks and work environment. Short and open communication paths are also important. Data from Apple further show the importance of selecting the right type of individuals in the first place, while Microsoft places importance on formal recognition of involvement and innovation contribution.

The trade-off between guiding the EDI efforts with structures, processes and systems on the one hand, and letting results emerge organically as a natural output of the workings of an innovation-focused and individualized culture on the other, is subject to experimentation even in these leading companies. In an effort of fusing the best tactics from two worlds, strategic intent, supporting structures and processes including training are combined with trust in peoples' abilities, drive and self-motivation. Google puts more faith in self-organization around the employees, while Apple more strongly emphasizes processes and procedures enabling EDI. There is also much discussion in the literature about what part of the innovation process can benefit most from the extant involvement of employees, not only experts, but what is referred to as ordinary employees. Here, Microsoft and Apple focus essentially on pre-release versions of new products to be tested by as many employee users as possible. Hence, prototypes and alpha versions of products are engineered by specialists and ordinary employees mostly contribute to testing, albeit on more primitive versions than what might be submitted to customers. In Google, conversely, a broad range of employees are involved from the very first stages of idea generation and contribute throughout the whole process until public launch. It is an explicit objective in Google to hire innovators at all levels and in all jobs and combined with the employee-centric organization this makes the employee a total innovation resource in Google.

The gains, finally, reaped from employee-driven innovation in terms of competitive advantage are many. At the most direct level it is about getting broad detailed and initiated feedback on new products in view of discovering and subsequently eliminating as many potential problems as possible. More indirect benefits relate to building a solid and sustainable innovation culture that potentially can create a stream of competitive advantages both in terms of innovations of various kinds. Again, Google stands out as virtually all block buster innovations emanating from the Mountain View based firm originate in ideas brought forth by spontaneous employee experimentation and interactions.

As a final note, we would like to emphasize that enhancing the use of EDI does not mean that one should forget about the customer. End users will always be the ultimate judges of innovation: it was made clear already by Schumpeter! In the companies we studied, employees are highly aware of customers' needs, expressed on unexpressed, partly met or still unmet. Based on this profound customer knowledge, employees develop, test and enhance new ideas. Hence, the input that comes from employees can only complete the input coming from customers outside the organization.

## VI. Limits and Further Research

Analyzing Microsoft, Google, and Apple cases we highlighted a novelty approach of employee management engage in developing innovation into organization. As this work is based on secondary data analysis, we suggest for future research a deeper investigation on the same business cases and an enrichment of new cases. Moreover, we can give more consistency to the research investigating the relationship between employees, inter-organizational networks [62] - such as communities, customers, and lead-users – and innovation. Particularly, the previous suggested model could be promising for the conceptualization of even more open organizational model.

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